

REMARKS

This submission is intended as a full and complete response to the Office Action dated June 9, 2009. In the Office Action, the Examiner notes that claims 1-32 are pending, of which claims 1-32 stand rejected. Claims 1-5, 12, 17-19 22 and 31-32 are amended; claims 25-30 are canceled; and claims 6-16, 20, 21, 23 and 24 continue unamended. Claim 1 is amended to overcome the rejections under 35 U.S.C. §112, first paragraph; Claims 2-5, 17-19, 22, 31 and 32 are amended to more clearly define the invention; and Claims 12 and 31 are also amended to correct typographical errors. No new matter is added by the amendments.

THE CLAIMED INVENTION

As discussed in the response filed in the present application on March 17, 2009, the claimed invention is of commercial significance to both sellers and buyers of commercial pipeline gas, the price of which is determined based upon its BTU value. This is the same basis used by local gas companies for billing their residential and commercial customers.

Independent claim 1 as amended addresses the problem of compositional analysis of a pressurized multi-phase fluid stream flowing in a pipeline. In particular, independent claim 1 is directed to a method for obtaining a homogeneous sample. The analysis can be performed by any existing or later developed means – that is not the problem being solved. Rather, the problem being solved by the method of claim 1 is obtaining a homogeneous sample of the pressurized multi-phase fluid stream flowing in a pipeline.

The fluid stream consists of a majority component that is hydrocarbon gas, and a minor component consisting of one or more hydrocarbon liquids and water in the form of vapor, aerosols, droplets and/or liquid streams. The homogeneous sample of the majority and minority components is obtained by injecting one or more surface active agents into the fluid stream in an injection zone. The surface active agent(s) are injected at a rate that is sufficient to form a stable, uniform foam including the hydrocarbon gas and the one or more hydrocarbon liquids and the water. The surface active agent(s) are mixed with the fluid stream in a mixing zone to form this uniform foam composition which flows

through the pipeline downstream of the mixing zone. A portion of the uniform foam composition is withdrawn from the pipeline at a sampling point, and the withdrawn portion is passed through a sampling loop that is in communication with the pipeline. A homogeneous sample of predetermined volume of the foam is removed from the sampling loop for compositional analysis. Dependent claims 2 - 18 are directed to additional method steps and/or limitations.

Independent claim 19, as amended, is directed to an apparatus for obtaining a homogeneous sample of a multi-phase pressurized fluid stream flowing through a pipeline for compositional analysis. Like claim 1, the preamble of claim 19 specifies that the fluid stream includes a hydrocarbon gas as a major component and a minor component consisting of one or more hydrocarbon liquids and water mixed with the gas. The apparatus of claim 19 comprises: an injection means for adding a predetermined amount of one or more surface active agents to the fluid stream; a means for mixing the one or more surface active agents with the components of the fluid stream in a mixing zone to form a uniform foam composition in the pipeline; a sampling probe located in a sampling zone in the pipeline downstream of the mixing zone for removing a portion of the foam composition from the pipeline; a sampling conduit on the exterior of the pipeline in fluid communication with the probe; and a sample removal means for withdrawing a predetermined volume of the foam composition from the exterior sampling conduit. Dependent claims 20 - 24 are directed to additional apparatus elements and/or limitations.

Independent claim 31 is directed to an apparatus for creating a homogeneous gas-liquid mixture for sampling. The apparatus includes an injection zone including injection means having a discharge port in fluid communication with a moving a stream of gas-liquid mixture contained in a pipeline for injecting a foam-generating surfactant agent into the gas-liquid stream. In addition, the apparatus includes a downstream mixing zone having a mixing means for mixing the surfactant and the gas-liquid stream to induce a uniform foam composition. Finally, the apparatus comprises a sampling zone downstream of the mixing zone that includes a sampling means for removing a sample of the foam composition from the stream in the pipe. Dependent claim 32 is directed to additional apparatus elements and limitations.

EXAMINER INTERVIEW

On June 5, 2009, the undersigned had several telephone communications with the Examiner to discuss matters related to this application.

The initial topic of discussion related to a proposed election of claims based on the following groups:

- 1) claims 1-18 (method),
- 2) claims 19-24 (apparatus for obtaining a compositional analysis is of a homogeneous sample),
- 3) claims 25-30 (apparatus for providing a homogeneous sample of a multi-phase pressurized fluid stream) and
- 4) claims 31-32 (apparatus for creating a homogeneous gas-liquid mixture for sampling).

The Examiner acknowledged that this was atypical, since the present application has already received a first office action on the merits.

After further consideration, the Examiner agreed to condense groups (3) and (4) into a single group.

Upon further inquiry by the undersigned as to the reason for the restriction requirement, the Examiner stated that the requirement was founded on an “examination burden” since an enablement issue under 35 U.S.C. § 112, first paragraph, was identified with respect to claim 1. The Examiner stated that step (f) of “analyzing the foam to determine the amount of hydrocarbon and water present” was not enabled by the specification. It was indicated that a 2006 issued patent taught such a process, but was not referenced in this application.

The Examiner also stated that there was additional prior art to apply to the apparatus claims.

The undersigned brought to the Examiner’s attention page 23, lines 9-11 of the application that describe that the analysis: “uses equation of state calculations in conjunction with chromatographic analysis to establish aqueous, liquid and gas phases. Karl Fischer titration for gas systems can be utilized to determine water content.”

Upon additional consideration, the Examiner stated that it was agreed by the Primary Examiner that the examination of this application could proceed without the restriction requirement.

THE CLAIM REJECTIONS UNDER 35 U.S.C. §112, FIRST PARAGRAPH SHOULD BE WITHDRAWN

Claims 1 – 18 were rejected under 35 U.S.C. §112, first paragraph, as failing to comply with the written description and enablement requirements. In particular, it was asserted in the Office Action that step (f) of Claim 1 is not disclosed by the specification.

By the present amendments to Claim 1, and in particular removal of the step of “analyzing the foam...”, it is respectfully submitted that the claim rejections under 35 U.S.C. §112, first paragraph (both as to written description and enablement) should be withdrawn as moot. In addition, for consistency, and to accurately describe the present invention, apparatus Claim 19 has been amended (a) to clarify that it is directed to obtaining a sample and (b) by removal of the language regarding the “analytical means for identifying the hydrocarbon and water components of the foam sample.”

The present invention is not concerned with a method for analyzing foam itself. Rather, the foam is created in the method to allow a homogeneous sample to be withdrawn from the pipeline. Although not included as a limitation in the amended claims, the homogeneous sample can then be analyzed, either with an on-line apparatus or at another off-line location, using existing analysis means, whether previously developed or invented in the future. Typically, the analysis occurs after the homogeneous sample is defoamed.

For further clarity, Claims 3-5 are amended to recite that the “homogeneous sample” is analyzed, rather than the “foam sample.” In addition, Claims 17-18 are amended to recite that the “homogeneous sample” is used for the stated purpose, rather than the “analysis” being used for the stated purpose.

THE REJECTION OF CLAIMS UNDER 35 U.S.C. §102(b) IS UNTENABLE

Claims 19-23, 25-29 and 31-34 were rejected under 35 U.S.C. §102(b) as being anticipated by Djabbarah et al. U.S. Patent No. 5,470,749 (hereinafter “Djabbarah”). Applicant respectfully traverses this rejection.

Applicants respectfully traverse all of the grounds of rejection of these claims, and respectfully submit that the additional explanation and arguments presented herein overcome all of the grounds for rejection.

THE LEGAL STANDARDS UNDER 35 U.S.C. §102

It is well-established law that to be anticipatory, a prior art reference must disclose each and every element of the claim or claims at issue. Further, it is well settled that the prior art reference must show the elements arranged as required by the claims. In re Bond, 910 F.2d 831, 15 USPQ2d 1566 (Fed. Cir. 1990); Manual of Patent Examining Procedure § 2131, Eighth Edition (August 2001), July 2008 Revision.

THE DJABBARAH REFERENCE IS DIRECTED TO AN UNRELATED AND NON-ANALOGOUS PROBLEM

Djabbarah et al. U.S. Patent No. 5,470,749, entitled “Metering of Two-Phase Fluids Using Flow Homogenizing Devices and Chemicals,” is directed to a method of measuring steam quality by converting the steam into stable foam via surfactant. The purpose of the method of Djabbarah is to measure the steam quality for injection into wells for enhanced oil recovery. The apparatus disclosed in Djabbarah, therefore, is used in the rejection only for its teachings of converting steam into foam, wherein a voltage drop across the foam is measured to determine the streaming potential coupling coefficient. In particular, it is only after steam is withdrawn from the main pipeline that it is converted to a foam composition, and the streaming potential coupling coefficient is measured.

THE CLAIM REJECTIONS UNDER 35 U.S.C. § 102 SHOULD BE WITHDRAWN

Turning to the claim rejections under 35 U.S.C. § 102 in the instant application, Applicant believes that the following explanations and remarks will establish that the Djabbarah reference does not teach the limitations of the rejected claims, and that the rejections under 35 U.S.C. § 102 should be withdrawn.

Importantly, with respect to the claims at issue, the disclosure of Djabbarah does not contain the limitations of the present claims arranged as required in independent Claims 19 and 31. In the present independent apparatus claims, the injection means injects the surfactant to the fluid stream (which comprises “a hydrocarbon gas as a major component and a minor component consisting of one or more hydrocarbon liquids and water mixed with the gas” as used in Claims 19, and “a moving stream of a gas-liquid mixture” as used in Claim 31) *contained in a pipeline*. This is important, as it is desirable to allow the fluid stream to pass through at least a portion of the pipeline in the present invention of Claims 19 and 31 as a foam composition. However, in the apparatus disclosed in Djabbarah, converting the flow of steam 10 in the pipeline 12 (Figure 1 of Djabbarah) into foam would serve no purpose, and indeed would be counterproductive to the purpose of the steam, i.e., for use as an injection fluid for enhanced oil recovery. Thus, in the arrangement of Djabbarah, surfactant is added only *after* a sample has been withdrawn into the sampling line 14.

In particular, the Office Action states that Djabbarah discloses “an injection means, a mixing means, a sampling probe, a sampling conduit in fluid communication with the probe and the pipe interior, a removal means and an analytical means.” While these broad elements may be disclosed in Djabbarah, they are clearly not disclosed in an arrangement according to the limitations of either the method or apparatus of the present claims.

Regarding Claim 19, the “injection means” is “for adding a predetermined amount of one or more surface active agents to the fluid stream.” As defined in the preamble, the fluid stream is “flowing through a pipeline.” The “sampling probe” is located “in a sampling zone in the pipeline downstream of the mixing zone for removing a portion of the foam composition from the pipeline.” The “sampling conduit” is “on the exterior of

the pipeline in fluid communication with the probe.” Finally, the “sample removal means” is for withdrawing a predetermined volume of the foam composition from the exterior sampling conduit. This arrangement is not at all the same as the arrangement of Djabbarah. As shown in FIG. 1, a pipeline 12 carries steam. A sample is withdrawn from the pipeline 12 into a sampling line 14. It is only at this point that the surfactant is incorporated to create a stable foam, in contrast to the apparatus of the present claim 1, in which the injection means adds surface active agents to the fluid stream flowing through a pipeline. In the present Claim 19, the pipeline into which the surface active agents are added is distinct from the sampling line; whereas in the apparatus disclosed in Djabbarah, the surfactants are added to the sampling line. This certainly cannot be considered anticipatory.

With respect to Claim 31, the “injection means” is provided with a discharge port “in fluid communication with a moving stream of gas-liquid mixture contained in a pipeline for injecting a foam-generating surfactant agent into the gas-liquid stream.” The “sampling zone” is downstream of the mixing zone and includes a “sampling means” for *removing a sample of the foam composition from the stream in the pipe*. This is quite different than the apparatus disclosed in Djabbarah, in which the steam is withdrawn from the pipe and subsequently mixed with surfactant. In Djabbarah, there is no sample of foam composition removed from the pipe – rather, once the foam is created (only in the sample line), it is passed to the capillary tube for measurement of the voltage drop across its length.

Since Claims 20-23 are dependent on Claim 19 and Claims 32-34 are dependent on Claim 31, all of the rejections under 35 U.S.C. § 102(b) should be withdrawn.

THE REJECTION OF CLAIMS UNDER 35 U.S.C. §103(A) IS UNTENABLE

Claims 24 and 30¹ were rejected under 35 U.S.C. §103(a) as being unpatentable over Djabbarah in view of Mullen U.S. Patent Number 5,597,950 (hereinafter “Mullen”). As the Examiner relies upon Djabbarah for all of the elements except for the means of injecting a defoaming composition, the rejection should be withdrawn for at least the same reasons as discussed above with respect to the rejections under 35 U.S.C. § 102(b).

Furthermore, Djabbarah and Mullen are not properly combinable. Mullen U.S. Patent Number 5,597,950, entitled “Surfactant Monitoring by Foam Generation,” is directed to a device for monitoring the presence or absence of active surfactant or other surface active agents in a solution or flowing stream. This device operates by introducing a gas under a surface of a surfactant-containing solution to generate a foam, and sensing a quantity of the foam above the surface, the quantity corresponding to active surfactant concentration. Mullen in no way relates to creation of a homogeneous gas-liquid mixture for sampling to determine the commercial value of hydrocarbon gas present in a gas stream containing minor amounts of liquid. In fact, Mullen attempts to solve a completely different problem, i.e., determining the amount of surfactant in a solution, where that amount is unknown. In the present invention, the amount of surfactant is known, as it is introduced into the pipeline via the injection means.

As discussed above, Djabbarah is directed to a method of measuring steam quality by converting the steam into stable foam via surfactant; the steam is used for injection into wells for enhanced oil recovery. Only after steam is withdrawn from the main pipeline into the sampling line is it converted to a foam composition. There would be no need to defoam the small amount in the sampling line. In contrast, in the present claim 24, the defoaming means is downstream of the sampling zone. As discussed above, in the apparatus of the present invention, the contents of the main pipeline are converted to a foam composition. Therefore, in the embodiments of Claim 24, it is desirable to convert the foam composition back into the gas/liquid mixture, as the fluid stream is a valuable product (i.e., hydrocarbon gas and a minor component hydrocarbon liquid).

¹ As presented in the claim amendments, claim 30 is now canceled.

CONCLUSION

In view of the remarks presented above, Applicant submits that this Amendment and Response addresses all of the points raised in the Office Action and that all of the claims are in condition for allowance. Accordingly, both favorable reconsideration of this application and prompt issuance of a Notice of Allowance are earnestly solicited. If the Examiner believes that there are any unresolved issues concerning any of the claims, we respectfully request that the Examiner telephone Ralph J. Crispino at (212) 885-9358 or Thomas E. Spath at (212) 885-9250 so that appropriate arrangements can be made for resolving such issues as expeditiously as possible.

The Commissioner is hereby authorized to charge any additional fees, or to credit any overpayment, due by reason of this Response to Deposit Account No. 01-0035.

Respectfully submitted,

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